

Remarks/Arguments

The Examiner is thanked for the thorough examination and search of the subject patent application.

Claims 15, 17, 27, 30 and 35-41 are pending; Claims 15, 17, 27, 30, 35 and 36 have been currently amended; Claims 37-41 have been newly added; Claims 1-14, 16, 18-26, 28-29 and 31-32 have been canceled. No new matter is believed to have been added.

Response to Claim Rejections under 35 U.S.C. 112

Reconsiderations of the rejection of Claims 27, 30 and 36 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement are requested in accordance with the following remarks.

Withdrawal of rejection under 35 U.S.C. 112, first paragraph, to Claims 27, 30 and 36 is respectfully requested as Claims 27, 30 and 36 have been currently amended.

Response to Claim Rejections under 35 U.S.C. 103

Applicants respectfully traverse the rejections for at least the reasons set forth below.

Response to Claims 15, 17 and 35

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As currently amended, independent Claim 15 is recited below:

15. A method for fabricating a circuit component, comprising:

providing a semiconductor wafer, a metal pad over said semiconductor wafer, wherein said metal pad has a sidewall and a top surface with a first region and a second region between said first region and said sidewall, and a passivation layer on said second region and over said semiconductor wafer, wherein an opening in said passivation layer is over said first region, and said first region is at a bottom of said opening;

providing an exposed metallization structure over said semiconductor wafer, over said passivation layer and on said first region, wherein said exposed metallization structure is connected to said first region through said opening, and wherein said exposed metallization structure comprises a metal bump used for a package interconnect; and

after said providing said exposed metallization structure, performing a sputter etching process with an argon gas.

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Reconsiderations of Claims 15, 17 and 35 rejected under 35 U.S.C. 103(a) as being unpatentable over Dass et al. (U.S. Pat. 6,162,652) in view of Chen et al. (U.S. Pub. 2003/0006271) and Fan et al. (U.S. Pat. 6,956,292) are requested in accordance with the following remarks.

Applicants respectfully assert that the method currently claimed in Claim 15 patentably distinguishes over the citations by Dass et al. (U.S. Pat. 6,162,652) in view of Chen et al. (U.S. Pub. 2003/0006271) and Fan et al. (U.S. Pat. 6,956,292).

The Examiner considers that because all of Dass et al., Chen et al. and Fan et al. teach methods of cleaning with ions, it would have been obvious to one skilled in the art to substitute one method for the other to achieve the predictable results of having an effective method of cleaning metal surfaces, particularly metal bumps. ~ See lines 4-7 on page 4, in the last Office Action mailed Jul. 24, 2008 ~

Applicants respectfully traverse the Examiner's opinion because it would not have been obvious to one skilled in the art to apply Chen et al.'s plasma cleaning process or Fan et al.'s in-situ sputter clean process to cleaning Dass et al.'s solder bump 150. Dass et al. teach that "an oxide layer (e.g., PbO) may quickly form over solder bump 150 after the electroplating process. When it is unduly thick, this oxide may not melt during the reflow process, but should break or peel away from solder bump 150. It is appreciated that oxide or other residue buildup that remains on the surface of solder bump 150 after the reflow process can be cleaned by a scrubbing process." ~ *See col. 7, lines 55-61* ~ However, Chen et al. teach that a gold bond pad can be cleaned by a plasma cleaning process that cleans at a molecular level by bombarding the surfaces with ionized gas such as argon, but fail to teach, hint or suggest that an oxide layer (e.g., PbO) formed on solder bumps may be cleaned by Chen et al.'s plasma cleaning process of bombarding the solder bumps with ionized gas. ~ *See para. [0013]* ~ Therefore, those skilled in the art would not come up with applying Chen et al.'s plasma cleaning process to cleaning Dass et al.'s solder bump 150.

Fan et al. teach that an in-situ sputter clean process can be performed to clean an exposed contact pad 12 but not to clean a solder bump 28. ~ *See col. 3, lines 51 and 52 and col. 5, lines 1-14* ~ Therefore, those skilled in the art would not come up with applying Fan et al.'s in-situ sputter clean process to cleaning Dass et al.'s solder bump 150 by removing an oxide layer (e.g., PbO) because Fan et al.'s solder bump 28 is not taught to be cleaned by an in-situ sputter clean process or a sputter etching process.

For at least the foregoing reasons, withdrawal of the rejection to Claim 15 under 35 U.S.C. 103(a) is respectfully requested.

Applicants respectfully submit independent Claim 15 patentably distinguishes over the prior art references, and should be allowed. For at least the same reasons, dependent Claims 17 and 35 patentably define over the prior art as well.

Response to Claims 27, 30 and 36

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As currently amended, independent Claim 27 is recited below:

27. A method for fabricating a circuit component, comprising:

providing a semiconductor wafer, a metal pad over said semiconductor wafer, wherein said metal pad has a sidewall and a top surface with a first region and a second region between said first region and said sidewall, and a passivation layer over said semiconductor wafer and on said second region, wherein an opening in said passivation layer is over said first region, and said first region is at a bottom of said opening;

providing an exposed metallization structure over said semiconductor wafer, over said passivation layer and on said first region, wherein said exposed metallization structure is connected to said first region through said opening, and wherein said exposed metallization structure comprises a metal bump used for a package interconnect; and

after said providing said exposed metallization structure, performing an ion milling process with an argon gas.

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Reconsiderations of Claims 27, 30 and 36 rejected under 35 U.S.C. 103(a) as being unpatentable over Dass et al. (U.S. Pat. 6,162,652) in view of Chen et al. (U.S. Pub. 2003/0006271) and Fan et al. (U.S. Pat. 6,956,292) are requested in accordance with the following remarks.

Applicants respectfully assert that the method currently claimed in Claim 15 patentably distinguishes over the citations by Dass et al. (U.S. Pat. 6,162,652) in view of Chen et al. (U.S. Pub. 2003/0006271) and Fan et al. (U.S. Pat. 6,956,292).

The Examiner considers that because all of Dass et al., Chen et al. and Fan et al. teach methods of cleaning with ions, it would have been obvious to one skilled in the art to substitute one method for the other to achieve the predictable results of having an effective method of cleaning metal surfaces, particularly metal bumps. ~ *See lines 4-7 on page 4, in the last Office Action mailed Jul. 24, 2008* ~

Applicants respectfully traverse the Examiner's opinion because it would not have been obvious to one skilled in the art to apply Chen et al.'s plasma cleaning process or Fan et al.'s in-situ sputter clean process to cleaning Dass et al.'s solder bump 150. Dass et al. teach that "an oxide layer (e.g., PbO) may quickly form over solder bump 150 after the electroplating process. When it is unduly thick, this oxide may not melt during the reflow process, but should break or peel away from solder bump 150. It is appreciated that oxide or other residue buildup that remains on the surface of solder bump 150 after the reflow process can be cleaned by a scrubbing process." ~ *See col. 7, lines 55-61* ~ However, Chen et al. teach that a gold bond pad can be cleaned by a plasma cleaning process that cleans at a molecular level by bombarding the surfaces with ionized gas such as argon, but fail to teach, hint or suggest that an oxide layer (e.g., PbO) formed on solder bumps may be cleaned by Chen et al.'s plasma cleaning process of bombarding the solder bumps with ionized gas. ~ *See para. [0013]* ~ Therefore, those skilled in

the art would not come up with applying Chen et al.'s plasma cleaning process to cleaning Dass et al.'s solder bump 150.

Fan et al. teach that an in-situ sputter clean process can be performed to clean an exposed contact pad 12 but not to clean a solder bump 28. ~ *See col. 3, lines 51 and 52 and col. 5, lines 1-14* ~ Therefore, those skilled in the art would not come up with applying Fan et al.'s in-situ sputter clean process to cleaning Dass et al.'s solder bump 150 by removing an oxide layer (e.g., PbO) because Fan et al.'s solder bump 28 is not taught to be cleaned by an in-situ sputter clean process or an ion-milling process.

For at least the foregoing reasons, withdrawal of the rejection to Claim 27 under 35 U.S.C. 103(a) is respectfully requested.

Applicants respectfully submit independent Claim 27 patentably distinguishes over the prior art references, and should be allowed. For at least the same reasons, dependent Claims 30 and 36 patentably define over the prior art as well.

Conclusion

For at least the same reasons given above, new Claims 37-41 patentably define over the prior art as well.

Some or all of the pending claims are believed to be in condition for allowance.

Accordingly, allowance of the claims and the application as a whole are respectfully requested.

It is requested that should the Examiner not find that the Claims are now Allowable that the Examiner call the undersigned at 845-452-5863 to overcome any problems preventing allowance.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'SBA', with a stylized flourish extending from the end.

Stephen B. Ackerman, Reg. No. 37,761